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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/659,044	09/09/2003	Sarah E. Kim	Intel 10559-857001 / P173	3270
20985	7590	04/11/2005	EXAMINER	
FISH & RICHARDSON, PC 12390 EL CAMINO REAL SAN DIEGO, CA 92130-2081			LE, THAO X	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 04/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

8277

<b>Office Action Summary</b>	<b>Application No.</b> 10/659,044	<b>Applicant(s)</b> KIM ET AL.	
	<b>Examiner</b> Thao X. Le	<b>Art Unit</b> 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 November 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 13-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9, 12 and 29 is/are rejected.
- 7) ☒ Claim(s) 10 and 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 February 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. This application contains claims 13-28 drawn to an invention nonelected with traverse in the amendment filed on 11/18/04. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

### ***Drawings***

2. The drawings were received on 02/14/05. These drawings are acceptable.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-2, 7-9 are rejected under 35 U.S.C. 102(e) as being anticipated by US Pub. 2003/0218246 to Abe et al.

Regarding claims 1-2, Abe discloses an apparatus in fig. 1 comprising: first and second controlled collapse chip connection (C4) bumps 6a [0071], a unitary first metal

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layer 5 [0058], coupled to the first and second bumps 6a, the first metal layer 5 being formed in a trench of a dielectric layer 3 [0059], the first metal layer 5 being coupled to a top metal layer 2a [0057] of an integrated circuit die 20 [0057], the first metal layer 5 being adapted to transfer current from the first and second bumps 6a to the top metal layer of the integrated circuit die.

With respect to C4 bumps, Abe does not explicitly disclose such limitation.

However, the 6a bumps of Abe constitute a C4 bumps because they are being used to connect the device 20 in the CSP [0003]. Such CSP is also known as flip-chip or C4, see Milewski (6847118) in column 1 lines 57-65 or Kresge (6868604) in column 5 lines 13-23.

Regarding claims 7-9, Abe discloses the apparatus of further comprising a first dielectric layer 7 [0061] enclosing the first metal layer 5, fig. 1, wherein the first dielectric layer 20 comprises a self-planarizing, photo-definable polymer or non-photo-definable [0061].

5. Claim 5 is rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US Pub. 2003/0218246 to Abe et al.

Regarding claim 5, Abe discloses the apparatus wherein the first metal layer 5 comprises electroplated copper [0066].

The process limitations "electroplated" in claim 5 do not carry weight in a claim drawn to structure. In re Thorpe, 277 USPQ 964 (Fed. Cir. 1985).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 3-4, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pub. 2003/0218246 to Abe et al. in view of Applicant Admitted Prior Art (APA).

Regarding claim 3, Abe does not disclose the apparatus wherein the first and second bumps are coupled to first and second solder bumps of a substrate.

However, APA discloses the first and second C4 bumps (112B) are coupled to first and second bumps (130B) of a substrate 128, fig. 1C. At the time the invention was made; it would have been obvious to one of ordinary skill in the art to use the teaching of APA with Lin's device, because such C4 connection is typical in the art as disclosed by APA, specification page 1 [0001].

Regarding claim 4, Abe does not disclose the apparatus wherein the first metal layer is about 10 to 50 micron thick.

However, Abe discloses the first metal layer 5 has a general thickness. Accordingly, it would have been obvious to one of ordinary skill in art to use the general thickness teaching of Abe in the range as claimed, because it has been held that where the general conditions of the claims are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. See *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). Ohsawa (6563202) also discloses the thickness of such layer as layer 7 in column 7 lines 15-16.

Regarding claim 29, the combination of Abe and APA would result in the apparatus wherein the current from the substrate 128, fig. 1C of APA, is spread to both of the first and second solder bumps 130A-B and then both of the first and second C4 bumps 112A-B.

8. Claims 6 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pub2003/0218246 to Abe et al. in view of US 5950102 to Lee.

Regarding claims 6 and 12, Abe discloses the apparatus wherein the unitary first metal layer 18 is deposited in vias, fig. 1,

But Abe does not disclose the first metal layer 5 is deposited over the first base layer metallization, which is deposited over the top metal layer of the integrated circuit die, and wherein the apparatus further comprising diffusion barriers over and on the side of the first metal layer.

However, Lee discloses the apparatus in fig. 7 wherein the first metal layer 32, column 5 line 44, is deposited in vias, over the first base layer metallization 30, column 6 line 40, which is deposited over the top metal layer 26, column 6 line 5, of the integrated circuit die and wherein the apparatus further comprising diffusion barriers 30 and 38, column 6 line 35 over and on the side of the first metal layer 32. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to use the base layer metallization and diffusion barrier layer teaching of Lee with Abe's device, because these layers would serve as diffusion barrier and improve the bonding strength between the metal layers as taught by Lee, column 5 lines 42-43.

***Allowable Subject Matter***

9. Claims 10-11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art of record neither anticipated nor rendered obvious all the limitation of the claim 10 including a second metal layer over the first metal layer, the second metal layer being coupled the first bump, a third bump and the first metal layer, the second metal layer being adapted to transfer current from the first and third bumps to the first metal layer, which is adapted to transfer current to the top metal layer the integrated circuit die.

***Response to Arguments***

10. Applicant's arguments filed on 14 Feb. 2005 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X. Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on (571) 272 -1705. The fax phone

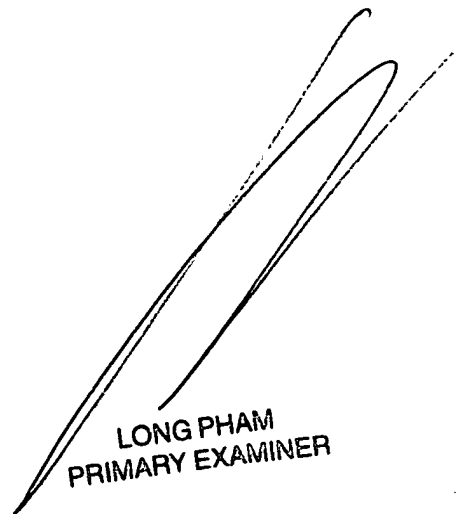


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number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thao X. Le  
04 Apr. 2005



LONG PHAM  
PRIMARY EXAMINER